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**«Латинські терміни  
в англомовній математичній літературі».**

**Методичний довідник до практичних робіт  
з курсу Основи наукової комунікації іноземною мовою.**

Одеса 2022

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### **Латинські терміни в англomовній математичній літературі:**

Методичний довідник до практичних робіт з навчальної дисципліни «Основи наукової комунікації іноземною мовою» для здобувачів вищої освіти першого року навчання за другим (магістерським) рівнем ОПП Середня освіта (Математика. Інформатика), ОПП Середня освіта (Математика. Мова і література (англійська)), ОПП Середня освіта (Математика) спеціальності 014.04 Середня освіта (Математика).

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Методичний довідник «Латинські терміни в англomовній математичній літературі» – це навчальне видання з методики засвоєння матеріалу практичних робіт з навчальної дисципліни «Основи наукової комунікації іноземною мовою».

Поданий у методичному довіднику матеріал охоплює питання розділу Латинські терміни, що формують уявлення про використання латинських термінів в англomовній математичній літературі.

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## **Вступ.**

Навчальна дисципліна ОК 2 «**Основи наукової комунікації іноземною мовою**» для здобувачів спеціальності 014.04 Середня освіта (Математика) за навчальним планом підготовки фахівця освітнього рівня «магістр» охоплює 4 кредити загальною кількістю 120 годин. Аудиторні заняття - 40 годин (практичні роботи), 80 годин відведено на самостійну роботу студентів. Зміст навчальної дисципліни розділено за програмою на два змістових модуля, перший з яких охоплює англomовний науковий дискурс, а другий присвячено науково-письмовій комунікації.

### **Мета та завдання навчальної дисципліни:**

- уміння продукувати наукові дискурси; усно та письмово презентувати складну комплексну інформацію в зрозумілій комунікативній формі, використовувати інформаційно-комунікаційні технології;
- уміння усно і письмово спілкуватися іноземною мовою в науковій, виробничій та соціально-суспільній сферах діяльності із професійних питань; опановувати спеціальну літературу та іншу інформацію з різних довідкових джерел;
- уміння використовувати спеціальну термінологію та відповідні різним ситуаціям спілкування вербальні засоби іноземної мови (в усній та письмовій формах);
- застосовувати міжкультурне розуміння у процесі безпосереднього усного і письмового спілкування в академічному середовищі. Належним чином поводити себе у типових академічних професійних, світських і повсякденних ситуаціях.

При викладанні математичних курсів та у науковій роботі майбутнім вчителям та науковцям виникає потреба користуватися англomовною математичною літературою. При цьому виникає проблема, пов'язана з тим, що в англomовній математичній літературі використовуються латинські терміни та вирази, котрі не перекладаються на англійську а пишуться в оригінальній формі, наприклад, *mutatis mutandis* (з урахуванням необхідних

змін). Іноді латинські (або стародавньо-грецькі) вирази пишуть у скороченій формі, наприклад, *ibid.* (скорочення від *ibidem*, що означає - у тому ж місті, у тому ж джерелі інформації). Проблема в тому, що у таких випадках слід читати ці вирази, так як у латині, а не відповідно до правил читання в англійській мові. Друга проблема полягає в тому, що в англійській математичній літературі (втім, як і в інших сучасних мовах) є багато термінів латинського та стародавньо-грецького походження множини від котрих в англійській мові утворюють за правилами латинської та стародавньо-грецької мови, відповідно. Наприклад: *momentum* – *momenta*, *radius* – *radii*. Третя проблема полягає в тому, що прізвища не англійських математиків в англійській літературі пишуть як в оригіналі (на відміну від української або російської мови, де використовується кирилиця) і читають як в оригіналі. Наприклад, прізвище італійського математика Фібоначчі пишуть як *Fibonacci* та читають Фібона'ччі з наголосом на передостанньому складі, як у італійській, а прізвище швейцарського математика котрого в російськомовній літературі називають Эйлер пишуть як *Euler* та читають як Ойлер, згідно з правилами німецької мови (він належав до німецької спільноти Швейцарії).

Даний довідник має на меті розтлумачити ці питання для студентів спеціальності 014.04 Середня освіта (Математика).

Відповідно до поставленої мети, далі текст на англійській мові.

### **Latin, Ancient Greek and other foreign imbeddings in mathematical English**

It is impossible to mention a branch of science, culture or technics where Latin and Ancient Greek words and phrases are not present. It is due to fruitful influence of Antics on contemporary sciences and culture. German philosopher F. Engels said ‘... modern Europe would be impossible without the basement laid by Greece and Rome ‘.

Teaching mathematics in English we face certain peculiarities uncommon for Ukrainian and Russian mathematical languages. Our remarks below may be

interesting for persons teaching mathematics in English in Ukrainian schools and universities.

1. First of all Latin (Roman) expressions and words are widely used.
2. Plural forms of Latin words are constructed in their Latin manner.
3. Some German and French words are used being pronounced as their original versions.
4. Personal names of non-English Mathematicians are written as their original forms (as in their native language). They must be pronounced as in their native language.
5. Sometimes mathematical notations differ from those used in Ukrainian and Russian mathematical literature.

### **Section 1. Latin (Roman) words and expressions**

Here we describe words and expressions widely used in English mathematical literature.

i.e. = id est (Latin) what means

e.g.= exempli gratia (Latin) for example

etc.= et cetera (Latin) and so on

vs. =versus (Latin) against

QED= quod erat demonstrandum (Latin) what is to be proved (phrase ascribed to Euclid)

Tabula rasa blank slate

Ibid. = ibidem (Latin) at the same place

Verbatim (Latin) word-for-word. Indicates a precise transmission of a phrase or text.

Mutatis mutandis (Latin) (used when comparing two or more cases or situations) making necessary alterations while not affecting the main point at issue.

Reductio ad absurdum (Latin) “argument to absurdity”) is a form of argument which attempts either to disprove a statement by showing it inevitably leads to a

ridiculous, absurd, or impractical conclusion, or to prove one by showing that if it were not.

Et al. = et alii or et alia (Latin) and others an abbreviation meaning “and others.” It is used to shorten lists of author names in text citations to make repeated referencing shorter and simpler.

Cf. = confer (Latin) compare (with the one referred to) . Usually used in footnotes.

Semi- (Latin) = hemi- (Ancient Greek) = half- (for example, semi-axis, hemisphere in Astronomy).

PS= post scriptum (Latin) written after (often used in written correspondence)

Pro forma (Latin) for form’s sake.

Q.v.= quod vide which see (way of directing the reader to a reference).

Viz. = videlicet (Latin) namely.

Circa (Latin) approximately (used with dates).

Alma mater university or college which granted ones degree.

Alumnus / alumna former member or student of a university or college (the ‘us’ ending is masculine, the ‘a’ ending feminine. The plurals are alumni and alumnae, respectively).

AD= anno Domini. ‘In the year of Our Lord’ indicates that the date is given in Gregorian calendar. Some authors use CE (‘current era’) instead of AD.

Ergo therefore.

Erratum/ errata error/ errors.

In re regarding.

In toto entirely (all in all).

Modus operandi manner or method of work characterizing a particular person’s professional habits.

Non sequitur ‘not following’. Used to indicate a statement or conclusion that does not follow from what has gone before.

PhD = Philosophy Doctor.

Other languages embeddings

Eigen - (German) own (should be pronounced as [aigen-]) for example eigenvalue (some authors use ‘characteristic value’ or ‘characteristic number’ instead), eigenvector, eigenspace .

Spur (German) trace is used as  $\text{sp } A$  meaning the trace of a matrix  $A$

Ansatz (German) expression.

## Section 2. Plurals of Latin and Greek words

Latin words ending with –m or -n

Singular	Plural
Medium	media
datum	data
continuum	continua
momentum	momenta
minimum	minima
criterion	criteria
polyhedron	polyhedra
erratum	errata
corrigendum	corrigenda

However, polygon polygona (admissible also polygons).

Words ending with –is, -ex, -ix.

Singular	Plural
Axis	axes
thesis	theses
hypothesis	hypotheses
vertex	vertices
index	indices
matrix	matrices



### Words ending with -us

focus	foci
radius	radii
conus (cone)	coni (cones),
modulus	moduli

### Words ending with -a

formula	formulae (formulas)
abscissa	abscissae

## Section 3. Pronunciation of non-English names

### French names

Name	Pronunciation
Galois	[galwa]
Ferma't	[fɛʁma]
Hadamard	[adamaʁ]
DeMoivre	[də mwavɛ]
Fourier	[fuʁje]
Pascal	[pas'kal]
Cauchy	[kɔʃi]
Liouville	[ljuvil]
L'Hospital	[lopital]
Lebesgue	[ləbɛg]
Vie'te	[viet]
Dirichlet	[diri'kle:]
Poincare	[pwãkaʁe]
Descartes (romanized version Cartesius)	[dekart]

## German and Hungarian

Kirchhoff	[ˈkɪʁçhɔf]
Kronecker	[kroneker]
Euler	[ˈɔylə]
Sturm	[ʃtɔrm]
von Neumann	[ˈnɔjmən ˈja:nɔf ˈlɔjɔf]
Schmidt	[ˈʃmɪt]
Leibniz	[ˈlaɪbnɪts]
Weierstrass	[ˈvaɪəʃtʁa:s]
Riesz	[ri:s]
König	[koˈnɪg]

## Italian

Fibonacci	[fiboˈnattʃi]
Bernoulli	[bərˈnoo(l)ē]
Cardano	[karˈdano]
Tartaglia	[tarˈtaʎʎa]

## Section 4. Difference between notations

Here we describe the difference in mathematical notation between English and Ukrainian/Russian literature.

$\tan x$        $\operatorname{tg} x$

$\binom{n}{m}$        $C_n^m$

$\sin^{-1} x$        $\operatorname{arcsin}$

Log      ( $\lg$  and  $\ln$  are not used in English)

## Appendix 1.

Table 1 shows common traditional endings for Latin or Greek singular nouns and their corresponding plural endings.

**Table1.**

### **Common Latin and Greek Noun Endings.**

<b>Singular ending</b>		<b>Plural ending</b>
-a	→	-ae
-en	→	-ina
-ex	→	-ices
-is	→	-es
-itis	→	-itides
-ix	→	-ices
-on	→	-a
-um	→	-a
-us	→	-i

Table 2 presents singular and plural forms of selected nouns derived from Latin and Greek/ English forms are shown.

Some dictionaries indicate that two plural forms – traditional and English – occur with equal frequency. However, the acceptability of an English plural form may differ by publication.

Caution^ Read the dictionary entry carefully. Sometimes the English plural is used for only a narrow definition of the term.

**Table 2.**

### **Singular and Plural Nouns Derived From Latin and Greek.**

Singular Form	Plural Form
analysis	analyses
basis	bases
criterion	criteria or criterions
datum	data
focus	foci or focuses
foramen	foramina or foramens
formula	formulae or formulas
genus	genera <sup>a</sup>
hypothesis	hypotheses
index	indices or indexes
matrix	matrices or matrixes
medium	media
nucleus	nuclei or nucleuses
parenthesis	parentheses
phenomenon	phenomena
radius	radii or radiuses
stimulus	stimuli
stratum	strata
synthesis	syntheses

a\*The plural ending for this word is an exception to the rule (see Table 1).

## Origins of some Mathematical terms.

Abscissa is the formal term for the x-axis in a graph. The word is a conjunction of ab(remove) + scindere (tear). Literally then, to tear or cut apart, as the x-axis does to the coordinate plane. The main root is closely related to the Latin root from which we get the word scissor. The mathematical use of the term was apparently coined by Leibniz around 1855.

Absolute Value The word absolute is from a variant of absolve and has a meaning related to free from restriction or condition. It seems that the mathematical phrase was first used by Karl Weierstrass in reference to complex numbers.

Acute is from the Latin word acus for needle, with derivatives generalizing to anything pointed or sharp. The root persists in the words acupuncture (to treat with needles) and acumen (mentally sharp). An acute angle then, is one which is sharp or pointed.

Angle comes from the Latin root angulus, a sharp bend. As with many g sounds the transfer from Latin to the German and English languages switched to a k spelling. The word ankle is from the same root.

Algebra comes from an Arabic book that revolutionized how mathematics was done in western cultures. "Al-jabr w'al-mugabalah" written by Abu Ja'far Ben Musa (about 825 AD) who was also known as al-Khowarazmi. The phrase Al-jabr at the start of the title became the word Algebra in western languages. The phrase means "the reunion of broken parts".

Algorithm, as it is used in mathematics means a systematic procedure to solve a problem. The word is derived from the name of the Hindu mathematician, al-Khowarazmi (See algebra). The first use of the word I am aware of was by G W

Leibniz in the late 1600. It remained a little known and little used term in western mathematics until the Russian mathematician Andrei Markov (1856-1922) introduced it. The term became very popular in the areas of math focused on computing and computation.

Analogy The word analogy comes from the early Greek roots ana + logos. Logos was the early Greek root for lots of related mental constructions such as word, speech, logic, and reason. An analogy refers to things which share a similar relation. Originally it was more of a mathematical term interchangeable with ratio or proportion; as in "2,4,8 is analogous to 3,6,12". Later this idea of similar relations was extended to things which shared a logical relationship. Analog clocks and computers are so named because they operate off mechanical objects (gears and pulleys) that transform motions in proportional movements.

Apothem The distance from the center of a regular polygon to the sides, the apothem, comes from the Greek term "to set off", as in to set apart. The word is frequently pronounced "a poth' em' with the accent on the second syllable, but the traditional, and dictionary pronunciation is with the accent on the first syllable, "ap' e thum" as in apogee, which shares the ap root, and means off from the Earth (gee from geos). Apothem appears to be of modern origin despite its ancient name, and seems to have first appeared in English in the mid 1800's

Arithmetic was the greek word for number, and is closely related to the root of reckon, which is becoming an obsolete (застарілий) term for count (except in some parts of the western and southern US where they "reckon" almost anything) (that was a joke folks).

Associative The root of the word associative, is the Greek root for our word social, soci. The first use of the word in the sense of a mathematical property was probably by W R Hamilton around 1850.

Asymptote The asymptote of a function as it is now used is much narrower than original Greek meaning. The word is believed to have been known to Apollonius

of Perga before 200 BC. Originally used for any two curves which did not intersect. Now it is used primarily for straight lines which serve as a limiting barrier for some curve as one of its parameters approaches infinity (+/-).

Average The meaning of average, as it is used in math today, comes from a commercial practice of the shipping age. The root, aver, means to declare, and the shippers of goods would declare the value of their goods. When the goods were sold, a deduction was made from each persons share, based on their declared value, for a portion of the loss, their AVERAGE.

Billion seems to have been a French creation, and was originally bi- million. The term originally meant  $10^{12}$  or one million millions, and still has this meaning in many countries today. In the US and some other countries, it is used for  $10^9$  or one thousand million. The table below compares the names as used in the US and in Germany:

Value -----German name-----US name

$10^6$  ----- Million ----- Million

$10^9$  ----- Millard-----Billion

$10^{12}$  ----- Billion -----Trillion

$10^{15}$ ----- Billiarde ----- Quadrillion

Cardinal numbers are numbers that express amounts, as opposed to ordinal numbers, which express order or rank. The term is from the Latin, cardin, for stem (стержень) or hinge. Cardinal today means most important or principal, with other things depending (hinging) on it. The first use appears to have been by R Percival in 1591,

Cardioid The path of a point on a circle as it rolls around another circle is sort of heart shaped and thus the term is from the Greek root for heart, kardia. The term appears to have first been used by Giovanni Salvemini de Castillon (1708-1791)

Catenary the name for the curve formed by a hanging rope is actually from the Latin root, *catenareus*, for chain. The word was developed in correspondence between Leibniz and Huygens around 1690, but there seems to be some disagreement about which used the term first.

Center The word center comes to us from a Greek root, *kentrus*, for a spur or sharp pointed object. The relation to the center of a circle seems obvious. A sharp point was made at a center to fix the spot, and a more dull (тупой) object was dragged around the center to form the circle.

Century Although now used almost exclusively for a period of one hundred years, century was originally the Latin term for any collection of one hundred items. In the Roman army a company consisted of one hundred men, and each was called a centurian.

Cevian A word created by French geometers around the end of the 19th century to honor the Italian Giovanni Ceva (1650?-1735). A cevian is a line segment from a vertex of a triangle to a point on the opposite side.

Chaos Although the ideas of chaos theory as we know it today have been actively studied at some level for most of the 20th century, the word dates only from an article in *American Mathematical Monthly* in 1975, "Period Three Implies Chaos".

Chi Square The statistical test, and the name for it are both credited to Karl Pearson around the year 1900.

Chord The Greek root of the chord, *chorde*, means gut (кишка) or string. The musical use of the term comes from a contraction of accord, two strings played together.

Circle The Latin root of the word circle is *circus*. The traditional shape of the large roofless enclosures in which the famous Roman Chariot races were run was circular or oblong, and thus the word came to describe this shape as well.



Congruent The Greek word congruent meant "coming together" or "working together". Whether applied to a geometric shape, or a military unit, it meant that all the parts fit together.

Conjugate is the union of the common Latin prefix com (together) and the root jube (yoke) and means to bind together in a pair. Mathematically it is often used for things that are opposites in some way, as in the complex conjugates. The same word in grammar refers to words of a common origin and related meaning, and in biology to an act of sexual union, for which the more common term is conjugal relations.

Converse is from the Latin roots com (great or intense) + vertere (to turn). The literal meaning is "to turn away". The verb converse (as in conversation), which has the same spelling, is from a completely different root.

Dean The term now used for the head of a department or faculty at a college is derived from the Latin deaconus which meant "chief of ten". The similar sounding deacon, for a church leader, is not related and comes from the Greek root diakonos for a servant. According to John Conway, the literal meaning is "one who raises the dust".

Diagonal comes from the Greek roots dia (to pass through or join) + gonus [angle] and describes the line segment which passes from the vertex of one angle to another in a polygon.

Diagram joins the roots dia (to pass through or join) with gram (written or drawn and earlier carved (вирезаний)). It literally means "that which is marked out", as by the crossing of two lines. This leads me to wonder how old the expression, "X marks the spot", could be.

Divide shares its major root with the word widow. The root vidua refers to a separation. In widow the meaning is obvious, one who is separated from the spouse. A similar version of the word was often meant to describe the feeling of

bereavement (тяжка втрата) that a widow would feel. The prefix, di, of divide is a contraction of dis meaning apart or away, as in the process of division in which equal parts are separated from each other.

Dozen The word dozen is a contraction of the Latin Duodecim (two + ten). This root also appears in dodecagon (from duodecagon) and duodenum, the first part of the intestine (кишечник) which is about twelve inches long.

Exponent is the union of the Latin roots exo(out of) + ponere (place). The literal interpretation is to make something visible or obvious. The English word expound from the same source means to make clear. An exponent is also used in English to describe a person who explains or interprets. Exponent, as a math term, was introduced by Michael Stifel (1487-1567) in his book, Arithmetica Integra, in 1544.

First is a native English word from the Old English fyrst which was a variant of fore (front)

Fraction comes from the Latin word frangere, to break. A fraction, then, representing the broken portion of some whole. The first known use of the word in English is by Geoffrey Chaucer in 1391 in the work, A Treatise on the Astrolabe.

Frustum (sometimes spelled frustrum) is from the Latin and means "a piece broken off". Mathematically it usually refers to a part of a solid cut off between two parallel planes, as opposed to truncated

Geometry is derived from the conjunction of the Greek word for the Earth, Geos, and the term for "to measure", metros. Literally then, Geometry means "to measure the Earth".

Googol A number invented by the nine year old nephew of Dr Edward Kasner when asked to think of a name for a 1 followed by 100 zeros.  $10^{100}$  is an incredibly large number. The largest reasonable estimates for the number of

particles in the universe is only about  $10^{85}$ . A googol is a million times a billion times this much.

Helix is preserved from the Greek and has maintained its meaning since antiquity. The Greek word seems to have been used generally to apply to ideas about wrapping or twisting, but only its mathematical meaning seems to have survived.

Histogram The root of histogram is from the Greek root histo, for tissue, and gram, for write or draw. E.S. Pearson, the first known user, apparently thought of each vertical bar as a cell.

Hour and year are both derived from the Greek root horo, which was applied to ideas about time and the seasons. In the Old Germanic horo became yero and year was thus derived from the same root which gave us hour. Today horoscope refers to fortune telling, but the practice is rooted in the original meaning, measuring the aspect of the stars and planets to measure the seasons. Horology is still the name for a maker of timepieces.

Hundred is from the German root hundert. The quantity that it represents has not been consistent over the years and has ranged from its present value, 100, to 112, 120, 124, and 132 at different times in different areas. The remnants these ancient measures still persist in the hundredweight measures of some countries representing 112 or 120 pounds, depending on the country. A hundred has also been used to represent an area of land equal to 100 hides (of cattle?). The measure of area was frequently used in colonial US, and parts of England in place of "Shire" or "Ward". A curious custom related to one hundred as a unit of land occurs in England when a member of the House of Commons wishes to resign his seat, which is illegal. An MP accepts stewardship of the "Chiltern Hundreds", an area of chalk hills near Oxford and Buckingham, and effects his release from Parliament.

Hypotenuse comes from the common Greek root hypo(for under, as in hypodermic -under the skin) and the less common tein or ten, for stretch. This last is the source

of our modern word tension. The hypotenuse was the line segment "stretched under" the right angle.

Isosceles is the union of the Greek iso (same or equal) and skelos (legs) and refers to two sides of a object as being the same length, as in isosceles triangles and isosceles trapezoids. The root iso shows up in many scientific and mathematical words such as isometry (same measure), and isomorphic (same shape). Isobar is used both in chemistry (two atoms with equal atomic weight) and in meteorology (lines connecting points of equal barometric pressure).

Logarithm is the combination of two Greek roots, Logos(reason or ratio) + arithmus (number). The ratio refers to the original method of constructing logarithms by geometric sequences. The name was introduced by John Napier (1550-1617) in his work on logarithms, originally in the Latin form, and subsequently in English in correspondence with Briggs.

Minute When the early sailors from the Eastern Mediterranean chose to cut an arc into parts, they chose fractions in the sexagesimal (base 60) system that was common to their period in history. Later when Latin writers described these small parts of an arc, they used the Latin phrase pars minuta, Latin for small parts. Our unit of time for 1/60 of an hour adopted and contracted this phrase into minute. The Conjugate word with the same spelling but different accent and pronunciation (mi nyoot') continues to refer to something very small.

The word MINUS for subtraction is drawn from the same root and refers to making something smaller. Other related words are minor (smaller of two), minced (cut into small pieces), miniature (on a small scale) and menu (a small list).

Multiply comes from the combined roots of multi, many, and pli, for folds, as in a number folded on itself many times. The first use I have found of the word as a verb, as in "multiply two by three" is credited to Chaucer in his 1391 work, A Treatise on the Astrolabe.

Negative numbers, and the equivalent word for negative were introduced by Brahmagupta, a Hindu mathematician around 600 AD. The Latin root of today's word is negare, to deny. The negative numbers, in this sense, denying or invalidating an equivalent positive quantity.

Plus (as in two plus four) comes from the early Latin word meaning "more". Extensions of the root were used for related ideas like fill, full, and abundant. Common words of today related to the same root are plenty, complement (meaning complete or fill, as in complementary angles, the amount needed to complete a right angle), plural (more than one), and surplus (abundant, more than enough). The word is closely related to the Greek root poly for many. [see polygon]

Polygon is from the Greek roots poli (many) and gonus (knees) and, interpreted literally as many angled. The relation between knee and angle relates to the flexed position of the knee. Poly appears in many words, and gonus remains mainly in its Latin derivative, genus, from which we get genuflect (to bend the knee). According to John Conway, terms like gnaw are from the same root, perhaps because the line of the jaw forms the same shape as the bent knee.

Polyhedron is the name for a solid with "many faces", The joining of poli (many) with hedros (face or seat). The hedros originally referred to any flat surface. Later, in the Latin, hedra was used for a chair, flat places are good to sit on, and the root is preserved in our words for cathedra (the Bishop's chair) and the Cathedral where it is kept.

Positive comes from the root word posit which means to place or set. This probably refers to the ancient method of counting with markers and counting tables. Positive numbers could be set out one by one.

Prime is from the Latin word for first, primus. Prime numbers are thus the first, or most basic, of numbers in a multiplicative sense. Other words drawn from the same root include primary [first in rank or order], Primitive [first of its kind],

prima donna [literally, first lady] and Principal [first in power, from the derivative form princeps for ruler]. The word Prince, again from princeps, originally referred to a king, but later the French applied the term to any male member of the royal family.

Quadratic is the Latin root for "to make square". The word square was itself derived from this root [see square].

Random comes to us from the old French root Randir, to gallop. Perhaps the idea is that, in full gallop, the horse or rider has abandoned control.

Secant is from the Latin root Secare, to cut. It is a proper name for for a segment that cuts through the circle. The word was introduced by Thomas Fincke in 1583 in Latin.

Second When the pars minutia [see Minute of an arc needed to be divided into even smaller parts, the  $1/60$  part of  $1/60$  of a degree needed a name also. Since it was the second small part, what could be more appropriate than pars minuta secundus. Later the term was shortened down to seconds and generalized to units of time which preserved the base 60 system.

Secundus is from the Latin root sequi [see Sequence] for "to follow", and thus second was the natural term for the ordinal following First

Sequence is from the Latin root sequi, to follow. In mathematics it refers to a series of terms in order. The root is the source of such modern words as consequence (the results that follow an event), suitor (one who follows a lover), and second (the one after the first).

Slope is derived from the latin root sleubh for slip. The relation seems to be to the level or ground slipping away as you go forward. The root is also the progenitor of sleeve (the arm slips into it) and, by dropping the s in front we get lubricate and lubricious (a word describing a person who is "slick", or even "slimy"). The mathematical meaning of slope was first used by V. F. Rickey around 1850. Both

the word, and the use of the letter m as its symbol, seem to have originated in the US.

Square is derived from the Latin phrase Exquadrare, like a quadratic. Over time the term was contracted into its present form, and came to mean the regular quadrilateral.

Subtract joins two easy to understand roots, the sub which commonly means under or below, and the tract from words like tractor and traction meaning to pull or carry away. Subtraction then, literally means to carry away the bottom part.

Symmetry is from the Greek roots sum + metros. The prefix refers to things which are alike, and metros is the Greek word for measure. Metros is the root of the word Geometry also.

Tangent is from the Latin tangere, to touch, aptly describing two curves which meet at a single point. Tangent is another creation of Thomas Fincke, and was first written by him in Latin around 1583.

Tangram is a name of a Chinese puzzle of seven pieces that became popular in England around the middle of the 19th century. It seems to have been brought back to England by Sailors returning from Hong Kong. The origin of the name is not definite. One theory is that it comes from the Cantonese word for chin. A second is that it is related to a mispronunciation of a Chinese term that the sailors used for the ladies of the evening from whom they learned the game. A third suggestion is that it is from the archaic Chinese root for the number seven, which still persists in the Tanabata festival on July seventh.

Thousand Our number for one thousand comes from an extension of hundred. The roots are from the Germanic roots teue and hundt. Teue refers to a thickening or swelling, and hundt is the root of our present day hundred. A thousand, then, literally means a swollen or large hundred. The root teue is the basis of such common words today as thigh, thumb, tumor, and tuber.

Topology comes from the Greek root *topos* (place). Before it was used in mathematics, it was applied to the geographic study of a place in relation to its history. The word was introduced in English by Solomon Lefschetz in the late 1920s. It appears that the word was originated around 1847 by Johann Benedict "Listing in place of the earlier usage *analysis situs*"

Torus is from the Latin word for bulge and was first used to describe the molding around the base of a column. Although it is usually used to describe the rotation of a circle about a line in its plane, the definition applies to the rotation of any conic section.

Trapezoid and Trapezium both words come originally from the Greek word for table. Today, in the USA, the term trapezoid refers to a quadrilateral with one pair of sides parallel and a trapezium to one with NO parallel sides. This is exactly the reverse of the original meanings (and the meanings in some countries, particularly England, today). Here is a short comment on how this came about from Jeff Miller, a teacher at Gulf High School in New Port Richey, Florida, who maintains an excellent page on the first use of some common mathematical terms: "TRAPEZIUM and TRAPEZOID. The early editions of Euclid 1482-1516 have the Arabic *hemmariphe*; trapezium is in the Basle edition of 1546. Both trapezium and trapezoid were used by Proclus (c. 410-485). From the time of Proclus until the end of the 18th century, a trapezium was a quadrilateral with two sides parallel and a trapezoid was a quadrilateral with no sides parallel. However, in 1795 a *Mathematical and Philosophical Dictionary* by Charles Hutton (1737-1823) appeared with the definitions of the two terms reversed: Trapezium...a plane figure contained under four right lines, of which both the opposite pairs are not parallel. When this figure has two of its sides parallel to each other, it is sometimes called a trapezoid. No previous use the words with Hutton's definitions is known. Nevertheless, the newer meanings of the two words now prevail in U. S. but not necessarily in Great Britain (OED2). Some geometry textbooks define a trapezoid



as a quadrilateral with at least one pair of parallel sides, so that a parallelogram is a type of trapezoid."

Truncated means to shorten by cutting off and is related to the Old English truncheon, which means a club or staff. Both words are derived from the Early French truncus which referred to a cutting from a tree used for grafting stock. A truncated solid is usually cut off by non- parallel lines as opposed to a Frustum.

Vector is derived from the Latin root vehere, "to carry". The root is also the source of everyday words like vehicle. The mathematical use of vector was introduced by W R Hamilton

Zero comes to us from the Arabs, the inventors of zero, and the Arabic word sifre, from which we also get the word cipher

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